



Dengue fever and El Nino/Southern Oscillation in Queensland, Australia: A time series predictive model

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Abstract:

BACKGROUND: It remains unclear over whether it is possible to develop an epidemic forecasting model for transmission of dengue fever in Queensland, Australia. **OBJECTIVES:** To examine the potential impact of El Nino/Southern Oscillation on the transmission of dengue fever in Queensland, Australia and explore the possibility of developing a forecast model of dengue fever. **METHODS:** Data on the Southern Oscillation Index (SOI), an indicator of El Nino/Southern Oscillation activity, were obtained from the Australian Bureau of Meteorology. Numbers of dengue fever cases notified and the numbers of postcode areas with dengue fever cases between January 1993 and December 2005 were obtained from the Queensland Health and relevant population data were obtained from the Australia Bureau of Statistics. A multivariate Seasonal Auto-regressive Integrated Moving Average model was developed and validated by dividing the data file into two datasets: the data from January 1993 to December 2003 were used to construct a model and those from January 2004 to December 2005 were used to validate it. **RESULTS:** A decrease in the average SOI (ie, warmer conditions) during the preceding 3-12 months was significantly associated with an increase in the monthly numbers of postcode areas with dengue fever cases (betaEuro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin)-0.038; p Euro Surveillance (Bulletin European Sur Les Maladies Transmissibles; European Communicable Disease Bulletin) 0.019). Predicted values from the Seasonal Auto-regressive Integrated Moving Average model were consistent with the observed values in the validation dataset (root-mean-square percentage error: 1.93%). **CONCLUSIONS:** Climate variability is directly and/or indirectly associated with dengue transmission and the development of an SOI-based epidemic forecasting system is possible for dengue fever in Queensland, Australia.

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Resource Description

Early Warning System: ☒

resource focus on systems used to warn populations of high temperatures, extreme weather, or other elements of climate change to prevent harm to health

A focus of content

Exposure : ☒

weather or climate related pathway by which climate change affects health

Climate Change and Human Health Literature Portal

Ecosystem Changes, El Nino Southern Oscillation, Temperature

Temperature: Fluctuations

Geographic Feature: ☒

resource focuses on specific type of geography

None or Unspecified

Geographic Location: ☒

resource focuses on specific location

Non-United States

Non-United States: Australasia

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Vectorborne Disease

Vectorborne Disease: Mosquito-borne Disease

Mosquito-borne Disease: Dengue

Mitigation/Adaptation: ☒

mitigation or adaptation strategy is a focus of resource

Adaptation

Model/Methodology: ☒

type of model used or methodology development is a focus of resource

Outcome Change Prediction

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Medium-Term (10-50 years)

Vulnerability/Impact Assessment: ☒

resource focus on process of identifying, quantifying, and prioritizing vulnerabilities in a system

A focus of content